#22/Appeal Brief 5-8-02 Hawkins

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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| Application of | : | |
| Takahashi YAMANAKA et al. | : | |
| Serial No. 09/143,318 | : | Group Art Unit - 2834 |
| Filed: August 28, 1998 | : | Examiner - Mark O. Budd |
| For: ULTRASONIC MOTOR AND ELECTRONIC DEVICE WITH ULTRASONIC MOTOR | : | Docket No. S004-3484(CPA) |

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COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

## BRIEF ON APPEAL



**S I R:**

An appeal has been taken from the final rejection of claims 1-8 and 10-21, and appellants present herewith their brief in support of the appeal.

**(1) Real Party of Interest:**

The real party of interest in this appeal is Seiko Instruments Inc.

**(2) Related Appeals and Interferences:**

Appellants and appellants' counsel are aware of no other appeals or interferences which will directly affect or be directly affected by or have a direct bearing upon the Board's decision in the present appeal.

**(3) Status of Claims:**

The present application was filed with claims 1-9. Claims 10-21 were added by amendment. Claims 1-8 and 10-21 stand finally rejected under 35 U.S.C. §103(a). The present appeal is directed to the final rejection of claims 1-8 and 10-21. No rejection is pending against claim 9.

**(4) Status of Amendments:**

In response to a final rejection dated August 20, 2001, an amendment after final was filed by facsimile on January 10, 2002 presenting claim amendments and arguments traversing the rejection of claims 1-8 and 10-21 under 35 U.S.C. §103(a). In an Advisory Action dated January 28, 2002, the Examiner denied entry of the amendment after final and indicated that the rejection of claims 1-8 and 10-21 under 35 U.S.C. §103(a) would be maintained. No second or subsequent amendment after final was filed.

(5) **Summary of Invention:**

The present invention relates to an improved structure for an ultrasonic motor in which insulation is provided between the power source of the self-oscillating drive circuit and the piezoelectric element of the motor (specification, pg. 3, lines 1-21). In a preferred embodiment, the ultrasonic motor comprises an oscillating body 3, a piezoelectric element 4, an oscillation drive circuit 11 and various other members (e.g., a supporting mechanism, a moving body and a pressing mechanism) (pg. 3, lines 1-17).

As pointed out by appellants at pages 1-2 of the specification, a wide variety of electronic devices are commonly equipped with an ultrasonic motor for use as a source of motive power. An illustration of a typical analog clock having such a construction is shown in Fig. 11 of the application drawings. An oscillating body 3 having a piezoelectric device 4 bonded thereto generates an oscillatory wave by self-excited oscillation to drive a moving body 5. A base plate 21 is directly connected to the positive terminal of a power supply for driving the clock and serves as a lead wire for carrying a positive potential to the movement. If a conventional ultrasonic motor were mounted to the base plate 21, electrodes of the piezoelectric device 4 short-circuit with the positive power supply terminal through the base plate

21 and stable driving becomes impossible. As a result, in order to mount a self-excited oscillation circuit (or self-oscillating drive circuit) for an ultrasonic motor, it is necessary to form the base plate of an insulating material or to provide a separate insulator between the base plate and the ultrasonic motor.

This is because the various components of the ultrasonic motor, including the oscillating member, the moving body, the output means, and a pressing mechanism, are typically formed of conductive materials. When a voltage is applied to the base plate 21, a current path would be formed between at least one of the electrodes of the piezoelectric element and at least one of the power supply terminals. This makes stable driving of the motor impossible. Since various components of the ultrasonic motor are formed of conductive materials, it becomes necessary to terminate the current path between the power supply and the piezoelectric device by forming components of the electronic device that come into contact with the ultrasonic motor of a non-conductive material. However, this imposes restrictions on the structure of the electronic device in which the ultrasonic motor is mounted. In a small electronic device, it is difficult to provide an insulating structure due to space restrictions and, if an insulating structure is mounted therein, it may be difficult or impossible to also mount an ultrasonic motor.

The present invention overcomes the foregoing difficulties by providing an ultrasonic motor which can be mounted in an electronic device without imposing structural restrictions on the electronic device (pg. 3, lines 15-22). In accordance with the present invention, the ultrasonic motor comprises an oscillating member for generating an oscillatory wave, a moving body frictionally driven by the oscillatory wave, a pressing mechanism for pressing the oscillating member against the moving body, and output means for transmitting an output force of the moving body for driving an external component. At least one of the oscillating member, the pressing mechanism, the moving body and the output means is formed of an insulating member.

By the foregoing structure, a current path is not formed between a power supply terminal and an electrode of a piezoelectric element since at least one of the oscillating member, the pressing mechanism, the moving body and the output means forming the ultrasonic motor is insulative in nature. It is thus possible to realize an ultrasonic motor which does not impose structural restrictions on a device in which it is mounted (pg. 3, lines 8-14).

In accordance with the present invention, when output means for transmitting an output torque is provided on the moving body, the above-described problem can be solved by

forming the output means of an insulating material. By such a construction, the object of the invention can be achieved without imposing restrictions on the shape and/or the materials of the oscillating member and the moving body, which relate closely to the output performance of the ultrasonic motor (pg. 3, lines 15-22).

As illustrated in Figs. 1 and 2 of the application drawings, for example, an ultrasonic motor is provided in which a current path between a power supply 10 included in a driving circuit 11 and an ultrasonic motor is cut off by virtue of the structure of the ultrasonic motor, so that no structural restrictions are imposed on an electronic device in which the ultrasonic motor is incorporated (pg. 5, lines 1-7).

As shown in Fig. 1, a driving signal generated by the driving circuit 11 powered by a power supply is applied to a piezoelectric element 4 (pg. 5, lines 8-12). The driving signal causes the piezoelectric element 4 to oscillate, and the amount and direction of displacement are determined by an oscillating body 3 to which the piezoelectric element 4 is bonded, id. A moving body 5 having a movement direction confined by a supporting mechanism 9 and pressed against the oscillating body 3 by a pressing mechanism 7 is moved by the oscillation of the oscillating body 3, and an output is applied outside the motor by an output extracting gear 6 (pg. 5, lines 13-17).

More specifically, as shown in Fig. 2 and described in the specification at page 5, line 20 through page 6, last line, a supporting plate 1 of the ultrasonic motor is formed of an insulating material and a center shaft 2 mounted on the supporting plate 1 is completely isolated from outside current. A piezoelectric element 4 having electrode patterns 8a, 8b, 8b' provided on its front and rear sides is bonded to an oscillating body 3 fixed to the center shaft 2. A moving body 5 is rotatably mounted on the center shaft 2. The moving body 5 is pressed against the oscillating body 3 by a pressing spring 7 mounted on the supporting plate 1. The driving circuit 11 supplies a driving signal to the piezoelectric device 4 through the electrode patterns 8a, 8b, 8b' enabling the generation of a progressive wave or a standing wave such that the oscillating body 3 oscillates in the circumferential direction with a secondary oscillation mode. As a result of oscillation of the piezoelectric element 4 and production of the standing wave in the oscillating body 3, the moving body 5 rotates about the center shaft 2.

A gear 6 formed of a plastic material and serving as output means is provided on the moving body 5. Although the gear 6 is formed separately from the moving body 5, it may instead be molded integrally therewith. The rotational movement of the moving body 5 is output from the ultrasonic

motor by the gear 6. Because the output extracting gear 6 and the supporting plate 1 are formed of insulating materials, there is no current path between the ultrasonic motor and the power supply.

Elimination of the current path between the power supply and the ultrasonic motor is not limited to formation of the output extracting gear 6 and the supporting plate 1 of insulating members as shown in Fig. 2. It is necessary only for one or more members of a current path to be formed of an insulating material, preferably one or more of the oscillating member, the pressing mechanism, the moving body and the output means (pg. 7, lines 1-7).

Operation of the device is described in the specification at page 7, lines 9-20. An alternating voltage is supplied to the electrodes provided on the front and rear sides of the piezoelectric device 4 by the driving circuit 11 and the moving body 5 is driven by way of friction by an oscillatory wave generated in the oscillating body 3. As further pointed out in the above-cited portion of the specification, when an ultrasonic motor is mounted in an electronic device in the prior art, if conductive components of the device become electrically shorted with at least one of the power supply terminals, the electrodes of the piezoelectric device may become shorted with the power supply

terminal through the output means and/or the supporting plate of the ultrasonic motor and stable driving becomes impossible.

In the above-described embodiment, the supporting plate 1 and the gear 6 are formed of insulating materials so that the electrodes of the piezoelectric device are electrically isolated from device components outside the ultrasonic motor. Thus, it is possible to realize a stable ultrasonic motor which is not adversely affected by the construction of the device in which it is mounted (pg. 7, line 21 - pg. 8, line 2).

In the above-described embodiment, because the current path between the power supply 10 and the ultrasonic motor is cut off by components of the ultrasonic motor, the ultrasonic motor does not impose structural restrictions on the electronic device in which it is mounted (pg. 8, lines 3-10).

In another embodiment illustrated in Figs. 3 and 4 of the application drawings and described in the specification at page 8, line 12 through page 9, line 6, the oscillating body 3 to which the piezoelectric device 4 having the electrode patterns 8a, 8b, 8b' is bonded is formed of an insulating material such as plastic. The oscillating body 3 thus terminates a current path between the power supply 10 and the ultrasonic motor. Even if the supporting plate 1, the

center shaft 2 and the moving body 5 are formed of conductive materials, there is no influence on the driving of the ultrasonic motor. Consequently, no structural restrictions are imposed on the electronic device in which the ultrasonic motor is mounted.

In the embodiment shown in Figs. 5 and 6 of the drawings, the supporting plate 1, the moving body 5 and the output extracting gear 6 are formed of an insulating material such as plastic and the moving body 5 and the gear 6 are integrally molded. Since the contacting surfaces of the supporting plate 1 and the oscillating body 3 are insulative, there is no current path between the power supply 10 and the ultrasonic motor.

Forming the moving body 5 and the gear 6 in an integrally molded fashion results in an increase in the degree of freedom of the output extraction. Thus, for instance, by making a thin moving body thin and beveling the gear as shown in Fig. 6, the direction of the output force of the motor can be altered and it becomes possible for the orientation in which the ultrasonic motor is mounted in an electronic device to be varied.

In the embodiment illustrated by Figs. 7 and 8 of the drawings and described in the specification at page 10, line 20 through page 11, last line, an insulating layer 12 is

formed on the supporting plate 1 and on the surfaces of a metal oscillating body 3 which make pressing contact with the moving body 5. Accordingly, a current path between the power supply 10 and the ultrasonic motor is cut off and no structural restrictions are imposed on an electronic device in which the ultrasonic motor is mounted.

The insulating layer 12 may be formed of an engineering ceramic such as alumina, zirconia, silicon nitride, titanium nitride or DLC (diamond-like carbon) or of an insulating plastic, or an oscillating body 3 having improved insulation and wear resistance is made by using aluminum or an aluminum alloy and conducting alumite processing on the contacting surfaces of the oscillating body 3 against which the moving body 5 presses to provide the insulating layer 12.

Figs. 9 and 10 and pages 12-13 of the specification describe an embodiment of an ultrasonic motor incorporated in an electronic device and a self-oscillation drive circuit of the ultrasonic motor. A signal generated by an oscillation driving circuit 32 is supplied to electrode patterns 8a, 8b, 8b'. It is possible to decide to which electrode pattern the driving signal is transmitted by transmitting a signal from a normal-reverse rotation signal generating means 30 to a switching circuit 31. The ultrasonic motor is used as a source of motive power of the analog electronic clock.

An insulating plastic oscillating body 3 of the kind shown above is mounted on a center shaft 2, and the center shaft 2 is fixed to a base plate 21 by a fastening screw 22. A piezoelectric device 4 having electrode patterns 8a, 8b, 8b' provided on its front and rear sides is bonded to the oscillating body 3. The moving body 5 is rotatably mounted on the center shaft 2, and the moving body 5 is pressed against the oscillating body 3 by a pressing spring 7 mounted on the base plate 21. An insulating plastic gear 6 serving as output means is disposed on the moving body 5, and this gear 6 rotates a number four gear 23 and further rotates a number three gear 24, a minute gear 25, a day gear (not shown) and a tube gear 26 at fixed speeds.

If the period of the alternating voltage applied to the piezoelectric device 4 and the number of teeth of the gears are set at predetermined values, time can be displayed by an hour hand attached to the tube gear 26, a minute hand attached to the minute gear 25 and a second hand attached to the number four gear 23.

In the electronic clock, the base plate 21 is connected to a positive power supply terminal. Whereas in the prior art there has been the restriction that a separate insulating structure must be provided by, for example, forming the base plate 21 and the number four gear 23 of an insulating

plastic, this limitation is overcome because the oscillating body 3 is made of an insulating material. Thus, a current path between the power supply 10, which is, in this case, the positive power supply terminal connected to the base plate 21, and the ultrasonic motor is cut, and there is no requirement for forming the number four gear 23 for transmitting the output torque of the ultrasonic motor from the output of an insulating material.

Thus, an ultrasonic motor according to the present invention can be mounted in an electronic device without imposing structural restrictions being on the electronic device and it is possible to obtain an ultrasonic motor which is simple to mount in a device and which can be used in a wide range of applications.

**(6) <u>Issues</u>:**

A primary issue presented by this appeal is whether the cited references to Miyazawa et al., Iino et al. and Suzuki et al. in view of Snek, Tokusima et al. or Kawai et al. suggest the subject matter recited in claims 1-8 and 10-21 so as to render the claims obvious under 35 U.S.C. §103(a).

Another primary issue presented by this appeal is whether the Examiner has made out a *prima facie* case of obviousness of the subject matter of claims 1-8 and 10-21.

(7) **Grouping of Claims:**

In the final Office Action, claims 1-8 and 10-21 were grouped together in one ground of rejection under 35 U.S.C. §103(a).

Appellants respectfully submits that the rejected claims fall in the following groups, the claims in each group being separately patentable for the reasons given below in section (8):

(a) Independent claim 1 and dependent claims 10, 11 and 12;

(b) Dependent claim 2;

(c) Dependent claim 3;

(d) Dependent claim 4;

(e) Dependent claim 5;

(f) Dependent claim 6;

(g) Dependent claim 7;

(h) Dependent claim 8;

(i) Independent claim 13;

(j) Dependent claim 14;

(k) Dependent claim 15;

(l) Dependent claim 16;

(m) Dependent claim 17;

(n) Dependent claim 18;

(o) Dependent claim 19;

(p) Dependent claim 20; and

(q) Dependent claim 21.

**(8) Argument:**

Claims 1-8 and 10-21 stand finally rejected under 35 U.S.C. §103 as being unpatentable over Miyazawa et al., Iino et a. or Suzuki et al. in view of Snek, Tokusima et al. or Kawai et al. The Examiner stated that each of the Miyazawa et al., Iino et al. and Suzuki et al. references disclose a self-excited vibration motor including a rotor, a stator base, pressing means and a drive circuit. The Examiner acknowledged that the primary references do not explicitly disclose the use of electrical insulation in the claimed manner, but took the position that it would have been obvious to provide proper insulation to protect workers or equipment from shock hazards or short circuiting. The Examiner also pointed out that Tokusima et al. and Kawai et al. teach that it is well known to provide piezoelectric ultrasonic motors with various parts formed of insulating material, including rotors, stators and pressing members.

The Examiner further stated that the claims do not recite the use of low power or any specific type of electronic component and concluded that shock elimination could serve as

a motivation for providing insulation to the claimed combination of elements.

Appellants vigorously disagree with the Examiner's interpretation of the claimed invention and the application of the prior art to the appealed claims.

First, appellants respectfully point out that the desire to avoid electric shock would not have motivated the ordinarily skilled artisan to combine or modify the cited references in the manner urged by the Examiner. The well-known use of insulation to protect workers from electrical shock has absolutely no relevance to the claimed invention or the cited references. The claimed invention and the prior art relate to an ultrasonic motor, which is inherently a miniature, low voltage device that does not produce a voltage or current sufficient to present an electrical shock hazard. The claims need not recite the inherent characteristics of an ultrasonic motor. Avoidance of electrical shock to workers would certainly not have led the ordinarily skilled designer to modify the cited references to include electrical insulation in the claimed manner.

Moreover, even if electrical shock avoidance did provide the requisite motivation to modify the cited references in the manner urged by the Examiner, such modification would not serve to replicate the claimed

invention. As described below, the claims recite a particular structure rather than the indiscriminate use of an insulating material in an ultrasonic motor.

The combined teachings of the references cited by the Examiner fail to disclose or suggest the claimed invention and fail to lead the ordinarily skilled practitioner to make the modifications necessary to replicate the claimed invention.

In particular, neither of independent claims 1 or 13 purports to claim exclusivity in the use of insulating materials in the construction of an ultrasonic motor. Independent claims 1 and 13 each explicitly recite a specific configuration for an electrical apparatus having an ultrasonic motor and do not recite the general use of an insulator in an ultrasonic motor.

In particular, independent claims 1 and 13 recite a configuration having at least three distinct features which are absent from the cited references, including: (1) mounting of an ultrasonic motor to a conductive member of an electrical apparatus through which a power supply current is passed from a power supply to an electrical device; (2) mounting of the ultrasonic motor to the conductive member such that a current path would exist between the conductive member and an electrode of a piezoelectric element of the ultrasonic motor

if the components of the ultrasonic motor were formed of conductive materials; and (3) at least one component of the ultrasonic motor (claim 13) or at least one of the oscillating member, the pressing mechanism and the moving body of the ultrasonic motor (claim 1) which could, if formed of a conductor, provide the current path between the conductive member and the electrode of the piezoelectric element, is formed of an insulating material (or has an insulating coating) to prevent formation of the current path without the need for providing an additional insulator between the conductive member and the ultrasonic motor.

The claim rejections are directed solely to the obviousness of forming one or more elements of an ultrasonic motor using an insulating material. The claim rejections entirely overlook the limitations of claims 1 and 13 described above. Appellants respectfully submit that claims 1 and 13 are not rendered obvious by prior art references which merely disclose that one or more elements of an ultrasonic motor may be formed of an insulating material. Such a rejection ignores the remaining elements of the claims.

The cited references do not disclose or suggest an electrical apparatus having an ultrasonic motor mounted to a conductive member through which a power supply current is passed. Nor do the cited references disclose or suggest that

the ultrasonic motor is mounted to the conductive member such that a current path would exist between the conductive member and an electrode of the piezoelectric element if the components of the ultrasonic motor were formed of conductive materials. There is no disclosure in the references cited by the Examiner that would have suggested the mounting of an ultrasonic motor directly to a conductive member of a device through which a current passes.

As described in the specification, it has become relatively common to form a mounting plate of a timepiece (to which the movement is mounted) of a conductive material so that the mounting plate can serve as a current path for carrying current from a battery to the timepiece movement. This is done to conserve space and reduce cost. In a prior art timepiece designed in this manner, however, when an ultrasonic motor is to be incorporated into the timepiece for driving a calendar wheel, the motor cannot be directly mounted to the conductive plate because a current path would be formed between the conductive plate and one or more electrodes of the piezoelectric element of the ultrasonic motor. As pointed out in the specification, the incorporation of an ultrasonic motor into the conventional timepiece necessitates redesign of the timepiece because the use of a conductive mounting plate is incompatible with the use of an ultrasonic motor.

Accordingly, steps taken to reduce the size and cost of the timepiece, such as the use of a conductive mounting plate, are rendered ineffectual when an ultrasonic motor is to be incorporated into the timepiece because the mounting plate must be formed of an insulating material to incorporate an ultrasonic motor in the timepiece so that the ultrasonic motor is not short-circuited by current flowing in the conductive mounting plate.

The claimed invention thus addresses a specific problem arising when an ultrasonic motor is mounted to a conductive member of an electronic device where a current path would otherwise exist between a power supply of the electronic device and a piezoelectric element of the ultrasonic motor. Independent claims 1 and 13 recite a structure in which an ultrasonic motor is mounted to a conductive member of an electronic apparatus carrying a power supply current thereof so that a potential current path exists between the power supply of the electronic device and the piezoelectric element of the ultrasonic motor. The claims do not merely recite a generic ultrasonic motor having an element formed of an insulating material. The claims explicitly require a specific configuration which results in the existence of a current path between the power supply for powering the self-oscillating drive circuit and the piezoelectric element of the conventional ultrasonic motor.

The cited references do not disclose or suggest the claimed configuration. The use of insulators in the construction of the ultrasonic motors of the cited references does not suggest the mounting configuration or the construction of the claimed ultrasonic motor.

For instance, Tokusima et al. disclose a stator 3 formed over piezoelectric vibrators 1, 2 in an ultrasonic motor enclosed in a case. Mounting of the Tokusima et al. motor directly to a conductive member of an electrical apparatus through which a current passes would place the lower-most member of the Tokusima et al. motor (piezoelectric vibrator 2) in direct contact with the conductive member and would clearly short-circuit the piezoelectric vibrator 2. However, this problem would not be alleviated by forming another component of the Tokusima et al. motor of an insulating material. If the Tokusima et al. motor were mounted to a conductive member, no other component of the motor would lie between the piezoelectric vibrator 2 and the conductive member. Thus, it cannot be said that forming any component of the Tokusima et al. motor of an insulator would avoid the problem solved by the present invention.

The same argument applies to the ultrasonic motors of Snek and Kawai et al. For instance, the base plates of Snek and Kawai et al. form a conductive path for electrode wiring of the piezoelectric element. Thus, mounting of the

Snek or Kawai et al. motors to a conductive member would directly short-circuit the piezoelectric element to the conductive member and render the motor inoperable. However, if the base plates were formed of an insulator, the conductive path would be broken and no power would be supplied to the piezoelectric element. In order to install these motors in a timepiece as described above, it would be necessary to install an additional insulator under the conductive base plate. Avoiding the need for an additional insulator in this manner is explicitly recited by each of claims 1 and 13.

Appellants respectfully submit that the Examiner misconstrued the claims as merely reciting the "placement" of an insulator, which the Examiner contends to be an obvious matter of design choice. The claimed invention does not relate to placement of an insulator, but to a specific configuration for an electrical apparatus. The present invention recited in claims 1 and 13 requires the mounting of an ultrasonic motor to a conductive member of an electrical apparatus. The conductive member is utilized to carry a power supply voltage. The ultrasonic motor is constructed such that the current flowing in the conductive member drives the self-excited oscillation circuit of the motor, which is mounted to the conductive member, but the piezoelectric element of the

motor is not short-circuited by the conductive member. The claimed configuration allows a motor to be mounted in an electrical apparatus without redesigning the apparatus and allows a size reduction by eliminating the need for an additional insulator. The ultrasonic motors of the prior art references can not be mounted to a conductive member and do not avoid the need for the additional insulator.

The inventive ultrasonic motor is required by claims 1 and 13 to be mounted in the electronic apparatus in a particular manner and to have a particular construction. The combination of elements recited in the claims results in the reduction in size of the apparatus and the elimination of the additional insulator required to mount the prior art ultrasonic motor to an electrical apparatus. The cited references do not suggest the requirements of claims 1 and 13.

By merely forming an indiscriminate component of the motor of an insulating material, a current path between the power source and the piezoelectric element would not be prevented unless the ultrasonic motor is mounted so that such component prevents any electrical contact between a conductive member and the piezoelectric element. Since the cited references contain no disclosure of mounting an ultrasonic motor directly to a conductive member, the obviousness rejections do not satisfy the standard for obviousness under

35 U.S.C. §103(a) and the rejection of claims 1-8 and 10-21 should therefore not be sustained.

A claim rejection based upon obviousness must be supported by evidence establishing the obviousness of each and every limitation of a rejected claim. Such evidence may consist of a reference which directly establishes this lack of novelty, or a line of reasoning consistent with and motivated by the cited art establishing that such limitations would have been obvious. Anything else is inadequate to meet this burden. There must be some teaching, reason, suggestion, or motivation found in the prior art that renders every limitation of a claim obvious to support an obviousness rejection under 35 U.S.C §103(a). See, e.g., Symbol Technologies, Inc. v. Opticon, Inc., 935 F.2d 982, 989, 18 USPQ2d 1885 (Fed. Cir. 1991). This burden cannot be met by citing references that, even if combined, fail to teach explicitly recited limitations.

Stated otherwise, an obviousness rejection under 35 U.S.C §103(a) cannot rely solely upon a combination of references that teach some limitations of a claim and omit others.

Rejection of independent claims 1 or 13 under §103(a) cannot be supported on the basis of the cited references. As pointed out by the Board in Ex Parte Clapp, 227 USPQ 972, 973 (BPAI 1985):

> To support the conclusion that the claimed combination is directed to obvious subject matter, either the references must expressly or impliedly suggest the modifications urged by the examiner to have been obvious.

The same situation exists here. There is nothing in the references that would expressly or impliedly teach or suggest the modifications required to the cited references to replicate the claimed invention. Nothing in any of the cited references would have suggested to one of ordinary skill in the art the mounting of an ultrasonic motor directly to a conductive member of an electronic device such that a current path between a power supply of the apparatus and a piezoelectric element of the motor exists, and the formation of a member of the ultrasonic motor formed of an insulating material, or with an insulating surface, to eliminate this current path. The use of an insulating material to form an arbitrary part of an ultrasonic motor does not eliminate the above-described current path.

Nor does the simplicity of the invention as expressed by the Examiner serve as a sufficient ground for rejecting the claims as obvious. In a proper obviousness determination, "[w]hether the changes from the prior art are 'minor', ... the changes must be evaluated in terms of the whole invention, including whether the prior art provides any

teaching or suggestion to one of ordinary skill in the art to make the changes that would produce the patentee's ... device." Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 935, 15 USPQ2d 1321, 1324 (Fed. Cir.), cert. denied, 498 U.S. 920 (1990). This includes what could be characterized as simple changes, as in In re Gordon, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984) (Although a prior art device could have been turned upside down, that did not make the modification obvious unless the prior art fairly suggested the desirability of turning the device upside down).

The mere fact that the prior art could be modified would not have made the modification obvious unless the prior art suggested the desirability of the modification. See Carl Schenck, A.G. v. Nortron Corp., 713 F.2d 782, 787, 218 USPQ 698, 702 (Fed. Cir. 1983), and In re Sernaker, 702 F.2d 989, 995-96, 217 USPQ 1, 6-7 (Fed. Cir. 1983), both citing In re Imperato, 486 F.2d 585, 587, 179 USPQ 730, 732 (CCPA 1973). As demonstrated above, if the prior art ultrasonic motors were directly mounted to a conductive member without interposing an insulative member therebetween, they would be rendered inoperable for their intended purpose because an electrode of the piezoelectric element would be short-circuited. The present invention provides a configuration by which an additional insulator is not needed for this purpose. The

prior art provides no motivation to effect such a modification.

Furthermore, the claims do not stand or fall together and each of the claims in groups (a) through (q) as defined above recites subject matter which is independently patentable from the claims contained in the other groups.

For instance, dependent claim 2 recites that the moving body of claim 1 comprises a movable member and output means for extracting an output of the movable member, and at least one of the movable member, the output means, the oscillating member and the pressing mechanism is formed of an insulating material. Neither the subject matter of claim 1 nor the cited references suggests the combination of claim 2.

Claim 3 recites that the moving body of claim 1 comprises a movable member and output means for extracting an output of the movable member, and the movable member and the output means are integrally molded using an insulating material. Neither the subject matter of claim 1 nor the cited references suggests the combination of claim 3.

Claim 4 recites that the insulating material of claim 3 is reinforced with at least one of glass fiber, glass beads and mica. Neither the subject matter of claim 1 or 3 nor the cited references suggests the combination of claim 4.

Claim 5 recites that the oscillating member of claim 1 is made of metal and an insulating layer is provided on a portion of the oscillating member in contact with the moving body. Neither the subject matter of claim 1 nor the cited references suggests the combination of claim 4.

Claim 6 recites that the insulating layer of claim 5 is formed of one of an engineering ceramic, alumina, zirconia and silicon nitride. Neither the subject matter of claims 1 or 5 nor the cited references suggests the combination of claim 4.

Claim 7 recites that the moving body of claim 1 is alumited and the oscillating member is formed of one of aluminum and an aluminum alloy and has plural faces in contact with the moving body. Neither the subject matter of claim 1 nor the cited references suggests the combination of claim 7.

Claim 8 recites that the volume resistivity of the insulating material of claim 1 is above $10^5\Omega$-cm. Neither the subject matter of claim 1 nor the cited references suggests the combination of claim 7.

Independent claim 13 differs from independent claim 1 by reciting that at least one component of the ultrasonic motor which could, if formed of a conductor, provide a current path between a conductive member and an electrode of the piezoelectric element, is formed with an insulating surface to

prevent formation of the current path without the need for an additional insulator between the conductive member and the ultrasonic motor. Claim 1 recites that one of the oscillating member, the pressing mechanism and the moving body of the ultrasonic motor is formed of an insulating material. The claims are patentably distinct from the prior art for the reasons discussed above and are separately patentable from each other because neither claim suggests the subject matter of the other.

Claim 14 recites that at least one of the oscillating member, the pressing mechanism and the moving body of the ultrasonic motor of claim 13 is formed of an insulating material. Neither the subject matter of claim 13 nor the cited references suggests the combination of claim 14.

Claim 15 recites that the moving body of claim 15 comprises a movable member, and output means for extracting an output of the movable member, and at least one of the movable member, the output means, the oscillating member and the pressing mechanism is formed of an insulating material. Neither the subject matter of claim 13 nor the cited references suggests the combination of claim 15.

Claim 16 recites that the moving body of claim 13 comprises a movable member, and output means for extracting an output of the movable member, and the movable member and the

output means are integrally molded of an insulating material. Neither the subject matter of claim 13 nor the cited references suggests the combination of claim 16.

Claim 17 recites that the insulating material of claim 13 is reinforced with at least one of glass fiber, glass beads and mica. Neither the subject matter of claim 13 nor the cited references suggests the combination of claim 17.

Claim 18 recites that the oscillating member of claim 13 is made of metal and an insulating layer is provided on a portion of the oscillating body in contact with the moving body. Neither the subject matter of claim 13 nor the cited references suggests the combination of claim 18.

Claim 19 recites that the insulating layer is formed of one of an engineering ceramic, alumina, zirconia and silicon nitride. Neither the subject matter of claim 13 nor the cited references suggests the combination of claim 19.

Claim 20 recites that the moving body of claim 13 is alumited and the oscillating member is formed of one of aluminum and aluminum alloy and has plural faces in contact with the moving body. Neither the subject matter of claim 13 nor the cited references suggests the combination of claim 20.

Claim 21 recites that the volume resistivity of the insulating material of claim 13 is above $10^5\Omega$-cm. Neither the subject matter of claim 13 nor the cited references suggests the combination of claim 21.

In view of the foregoing, appellants respectfully submits that claims 1-8 and 10-21 patentably distinguish over the prior art record and, therefore, the rejection of these claims under 35 U.S.C. §103(a) should not be sustained.

Respectfully submitted,

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## (9) Appendix

Appealed claims 1-8 and 10-20 are reproduced below in smooth form:

1. In an electrical apparatus having a power supply for supplying power to an electrical device and a movable member driven by an ultrasonic motor, the ultrasonic motor being mounted to a conductive member through which a power supply current is passed from the power supply to the electrical device, the ultrasonic motor comprising: a driving circuit for producing an oscillatory wave; a power source for powering the driving circuit; a piezoelectric element driven by the driving circuit to undergo vibration, the piezoelectric element and the driving circuit cooperating to form a self-oscillation circuit; an oscillating member in contact with the piezoelectric element for oscillating in response to vibration of the piezoelectric element; a moving body contacting the oscillating member to undergo movement in response to oscillation of the oscillating member; and a pressing mechanism for urging the moving body against the oscillating member; wherein the ultrasonic motor is mounted to the conductor such that a current path would exist between the conductor and an electrode of the piezoelectric element if the components of the ultrasonic motor were formed of conductive

materials, and at least one of the oscillating member, the pressing mechanism and the moving body which could, if formed of a conductor, provide the current path between the conductor and the electrode of the piezoelectric element is formed of an insulating material so as to prevent formation of the current path without the need for an additional insulator between the conductor and the ultrasonic motor.

2. An ultrasonic motor according to claim 1; wherein the moving body comprises a movable member and output means for extracting an output of the movable member, and at least one of the movable member, the output means, the oscillating member and the pressing mechanism is formed of an insulating material.

3. An ultrasonic motor according to claim 1; wherein the moving body comprises a movable member and output means for extracting an output of the movable member, and the movable member and the output means are integrally molded using an insulating material.

4. An ultrasonic motor according to claim 3; wherein the insulating material is reinforced with at least one of glass fiber, glass beads and mica.

5. An ultrasonic motor according to claim 1; wherein the oscillating member is made of metal and an insulating layer is provided on a portion of the oscillating member in contact with the moving body.

6. An ultrasonic motor according to claim 5; wherein the insulating layer is formed of one of an engineering ceramic, alumina, zirconia and silicon nitride.

7. An ultrasonic motor according to claim 1; wherein the moving body is alumited and the oscillating member is formed of one of aluminum and an aluminum alloy and has plural faces in contact with the moving body.

8. An ultrasonic motor according to claim 1; wherein the volume resistivity of the insulating material is above $10^5\Omega$-cm.

10. An ultrasonic motor according to claim 1; wherein the piezoelectric element has a first electrode disposed on a first surface for receiving a drive signal output by the driving circuit and a second electrode disposed on a second surface for outputting a signal to the driving circuit, and the driving circuit and the piezoelectric element together form a self-oscillation circuit.

11. An ultrasonic motor according to claim 1; further comprising a supporting member formed of an insulating material disposed under the piezoelectric element.

12. An ultrasonic motor according to claim 11; wherein the pressing mechanism comprises a spring extending from the supporting member and urging the moving body against the oscillating member.

13. In an electronic apparatus having a power supply for supplying power to an electrical device and a movable member driven by an ultrasonic motor, the ultrasonic motor being mounted to a conductive member serving through which a power supply current is passed from the power supply to the electrical device, the ultrasonic motor comprising: a piezoelectric element; a driving circuit cooperating with the piezoelectric element to form a self-oscillation circuit for vibrating the piezoelectric element; a power source for supplying power to the elctronic apparatus and to the driving circuit; an oscillating member in contact with the piezoelectric element to undergo oscillation in response to vibration of the piezoelectric element; a moving body disposed on the oscillating member to undergo movement in response to oscillation of the oscillating member; and a pressing mechanism for urging the moving body against the oscillating

member; wherein the ultrasonic motor is mounted to the conductor such that a current path would exist between the conductor and an electrode of the piezoelectric element if the components of the ultrasonic motor were formed of conductive materials, and at least one component of the ultrasonic motor which, if formed with a conductive surface, could serve as the current path between the conductor and the electrode of the piezoelectric element, is formed with an insulating surface so that an additional insulator is not needed between the conductor and the ultrasonic motor.

14. An electronic apparatus according to claim 13; wherein at least one of the oscillating member, the pressing mechanism and the moving body is formed of an insulating material.

15. An electronic apparatus according to claim 13; wherein the moving body comprises a movable member, and output means for extracting an output of the movable member, and at least one of the movable member, the output means, the oscillating member and the pressing mechanism is formed of an insulating material.

16. An electronic apparatus according to claim 13; wherein the moving body comprises a movable member, and output means for extracting an output of the movable member, and the

movable member and the output means are integrally molded of an insulating material.

17. An electronic apparatus according to claim 13; wherein the insulating material is reinforced with at least one of glass fiber, glass beads and mica.

18. An electronic apparatus according to claim 13; wherein the oscillating member is made of metal and an insulating layer is provided on a portion of the oscillating body in contact with the moving body.

19. An electronic apparatus according to claim 18; wherein the insulating layer is formed of one of an engineering ceramic, alumina, zirconia and silicon nitride.

20. An electronic apparatus according to claim 13; wherein the moving body is alumited and the oscillating member is formed of one of aluminum and aluminum alloy and has plural faces in contact with the moving body.

21. An electronic apparatus according to claim 13; wherein the volume resistivity of the insulating material is above $10^5\Omega$-cm.

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Attn: Board of Patent Appeals and Interferences

Re: Patent Application of Takahashi YAMANAKA et al.
Serial No. 09/143,318
Filed: August 28, 1998
Group Art Unit - 2834
Examiner: Mark O. Budd
Docket No. S004-3484(CPA)

S I R:

Appellants submit herewith, in triplicate, their brief on appeal in connection with the captioned application. A check in the amount $320.00 is enclosed herewith to cover the required appeal fee. Should the check prove insufficient for any reason, authorization is hereby given to charge any deficiency to Deposit Account No. 01-0268.

Respectfully submitted,

ADAMS & WILKS
Attorneys for Appellants

By: ______________________
Bruce L. Adams
Reg. No. 25,386

BLA:db
Enclosures

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